An Intro to R for Non-Programmers III

William F. Lamberti[1]

George Mason University

November 14, 2017

[1]MS in Statistical Sciences
Student in PhD Computational Sciences
and Informatics at George Mason University

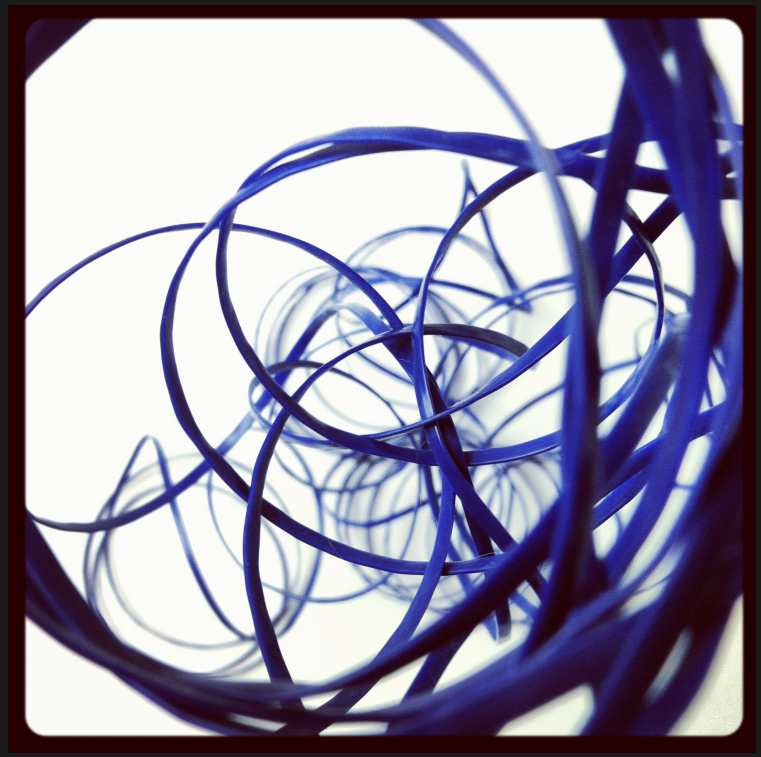
Outline

Introduction

- 1 hour course (7:30 PM - 8:30 PM)
- For those who know some of the basics of R but want to learn more
- Will reference `RGalleon.com` pages for additional information
- Will *not* go over the "why" of statistics (simply do not have the time)
- If you have any questions, please feel free to ask at any point

Loop Introduction: Basic Idea

- Sometimes you want to perform a calculation many times
- Is possible to "hard code" it for every time you want it done
- Or you can have a loop do it for you
- Different kinds
  - for
  - while
  - if
  - if-else



Loop Introduction: Basic Framework

```
1 #loop framework
2 "loop type"("condition to meet"){
3
4   do something here until met condition
5
6 }
```

For Loops: Overview

- Has R perform an operation "n" times
- Examples
  - Add 2 to a thing 5 times
  - Add the ith object to a thing where i goes from 1 to 10

For Loops: Example Code

```
1  #initializing values
2  x<- 1:5
3  n<- length(x)
4  temp<-0
5
6  #for loop
7  for(i in 1:n){
8
9    temp<- temp + x[i]
10
11 }
```

For Loops: Example Code

```
1  #initializing vlaues
2  x<- 1:5
3  temp<-0
4
5  #for loop
6  for(i in min(x):length(x)){
7
8    temp<- temp + x[i]
9
10 }
```

For Loops: Exercise

- collect the mean of 100 N(0, 1) random variables 10 times
- set the seed to 9876
- You have 10 minutes

For Loops: Exercise

```
#setting seed
set.seed(9876)
x<-1:100
means<-1:5

#for loop
for(i in 1:5){

  x<- rnorm(n=100, mean=0, sd=1)
  means[i]<-mean(x)

}
means
```

While Loops: Overview

- Has R perform an operation until a condition is no longer met
- Examples
  - Add 1 to a thing until it is greater than 100
  - simulate N(0, 1) until the sample variance is less than 1.20

While Loops: Example Code

```
1  #initialize value
2  temp<-0
3
4  #while loop
5  while(temp<10){
6
7    temp<- temp + 1
8
9  }
10 temp
```

While Loops: Example Code

```
1  #set the seed
2  set.seed(9765)
3
4  #initialize temp
5  temp<-c(0)
6  n<-0
7
8  #while loop
9  while(temp<1.20){
10
11   n = n + 1
12   temp<- var(rnorm(n=10))
13
14 }
```

While Loops: Exercise

- Pull observations from a N(1, 2) until you have pulled 50 observations
- set the seed to 12345
- You have 10 minutes

While Loops: Exercise

```
1  #setting seed
2  set.seed(12345)
3  #initialize vector
4  x<- c()
5  #create counter
6  i<-0
7
8  #while loop
9  while(length(x)<50){
10
11   #increase counter
12   i = i +1
13     #generate new observations
14     x[i]<-rnorm(n=1, mean=1, sd=2)
15
16 }
17
18 length(x)
19 x
```

If Loops: Overview

- Has R perform an operation if a condition is met
- Only performs operation once
- Examples
  - If the sample is less than 100, add 100 to the sample mean

If Loops: Example Code

```
1  #initialize value
2  xbar1<- 200
3  xbar2<- 50
4
5  #if loop
6  if(xbar1 < 100){
7
8    xbar1<- xbar1 + 100
9
10 }
11
12 if(xbar2 < 100){
13
14   xbar2<- xbar2 + 100
15
16 }
17
18 xbar1
19 xbar2
```

If Loops: Exercise

- Pull observation from a N(0, 1)
- If you pull an observation that is less than -2, pull another one
- Set the seed to 4145
- You have 10 minutes

If Loops: Exercise

```
#setting seed
set.seed(4145)

#initializing values
x<- rnorm(n=1)
x

#if loop
if(x < -2){

  x<-rnorm()

}

x
```

If-Else Loops: Overview

- Has R perform an operation if a condition is met (same as If Loop)
- But, if the condition is not met, R is told to perform another action
- Examples
  - If the sample is less than 100, add 100 to the sample mean.
  - Otherwise, subtract 100 from it.

If-Else Loops: Example Code

```
1  #initialize value
2  xbar1<- 200
3
4  #if loop
5  if(xbar1 >= 100){
6
7    xbar1<- xbar1 + 100
8
9  }else{
10
11   xbar1<- xbar1 - 100
12
13 }
14 xbar1
```

If-Else Loops: Exercise

- Collect 10 N(0,1) observations
- If the sample mean >= 10, keep it
- Otherwise, pull another sample of 10
- Set the seed to 113475
- You have 10 minutes

If-Else Loops: Exercise

```
1  #setting seed
2  set.seed(113475)
3
4  #initializing values
5  xbar<- mean( rnorm(n=10) )
6  xbar
7
8  #if-else loop
9  if(xbar >= 10){
10
11   xbar<- xbar
12
13 }else{
14
15   xbar<-mean( rnorm(n=10) )
16
17 }
18
19 xbar
```

Any Questions?